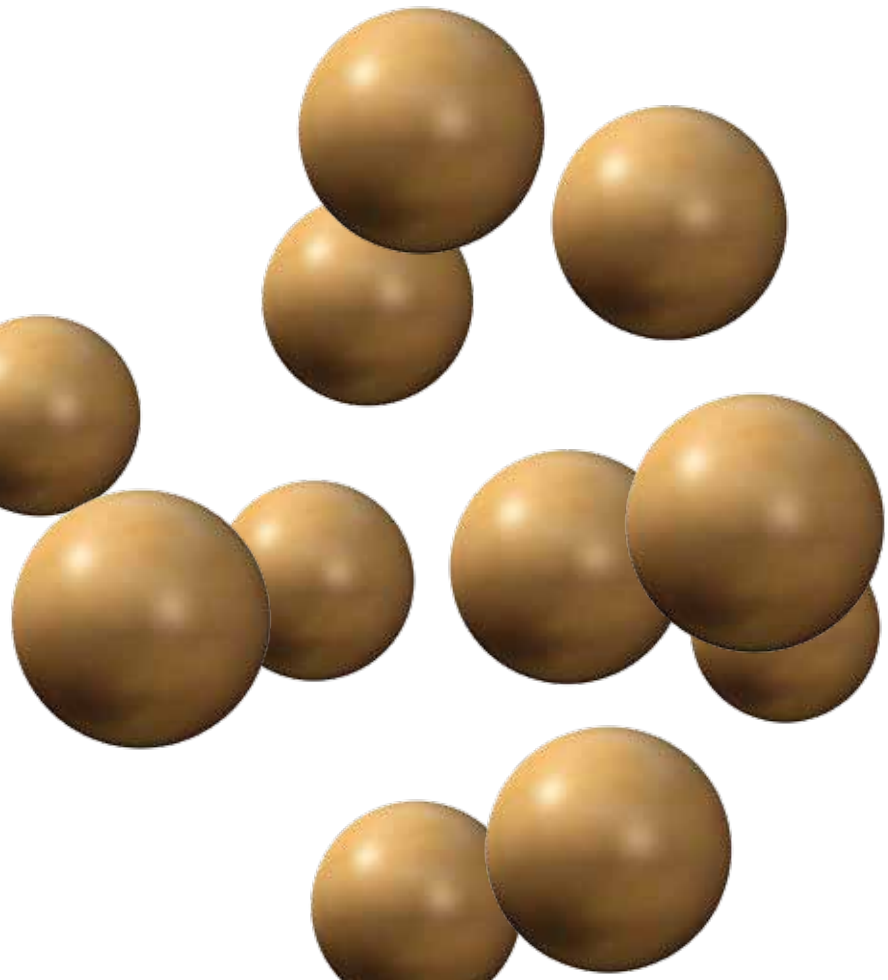
Surface-activated Dynabeads®

A wide product portfolio for flexible molecular separations



invitrogen™

The attraction is simply *magnetisk**

Select your surface-activated Dynabeads®

- → Monosized beads for rapid and efficient separations
- → Easy handling, and no sample loss
- → Superior reproducibility
- → A variety of ways to bind your ligand

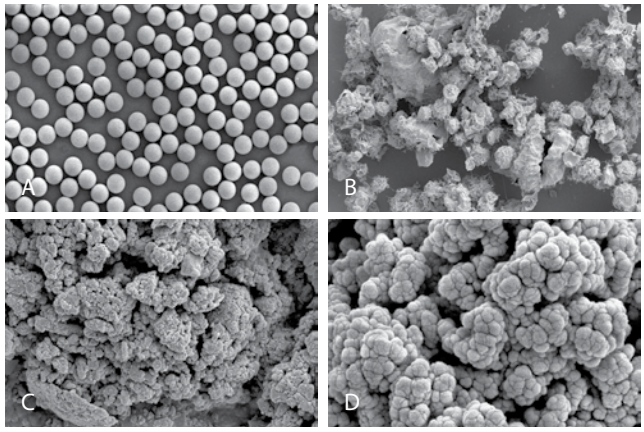


Figure 1. Dynabeads® reduce variability in your research. (**A**) The uniform, monodisperse superparamagnetic Dynabeads® are manufactured with highly controllable product qualities and to a unique level of reproducibility within and between batches. (**B–D**) Magnetic particles from alternative suppliers.

Dynabeads® magnetic separation technology

The monodisperse and uniform Dynabeads® provide optimal accessibility and highly reproducible reaction kinetics, ensuring rapid and efficient binding of your target molecules under conditions causing minimal stress. Chemical agglutination and non-specific binding are negligible with Dynabeads® compared to irregularly shaped magnetic particles (Figure 1).

The Dynabeads® disperse easily and are handled like a liquid. They exhibit no bead-to-bead magnetic attraction. Due to their superparamagnetic properties, they migrate to the magnet only when placed in a magnetic field. When the magnetic field is removed, the Dynabeads® immediately lose all their magnetic remanence and are easily resuspended.

Specific chemical groups facilitate binding of almost any ligand to the surface of the Dynabeads® for easy, convenient, and reliable isolation of your target (Figure 2).

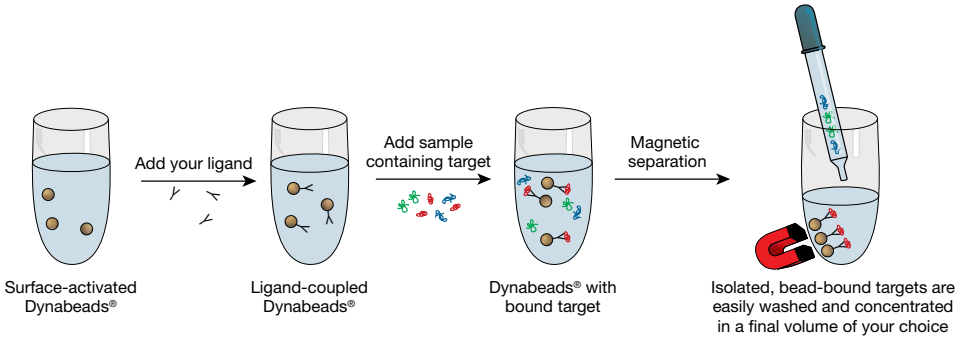


Figure 2. Dynabeads® allow for application flexibility. Dynabeads® magnetic separation technology utilizes the gentle affinity interactions between bead-bound ligands and their specific targets. Protocols take place in a single tube, with just a few handling steps. Magnetic separation allows easy washing and concentration of your target material.

* *Magnetisk* is the Norwegian word for magnetic. Did you know that Dynabeads® magnetic separation technology was pioneered in the 1980s by the Norwegian company Dynal, now part of Life Technologies? To learn more, check out www.invitrogen.com/dynal.

The Dynabeads® product portfolio

To meet the specific requirements of different applications, surface-activated Dynabeads® are available in a range of different bead sizes and surface chemistries (see Table 1 and ordering information). Different ligands (antibodies, proteins, etc.) require different bead surface properties and immobilization chemistries. Some considerations include:

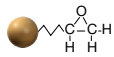
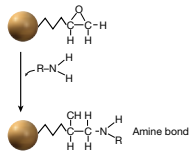
→ **Hydrophobic or hydrophilic:** Hydrophilic Dynabeads® allow gentle adsorption and coupling of ligands, keeping the functional activity of enzymes and labile proteins intact after immobilization. Hydrophobic Dynabeads® are optimal for coupling of antibodies for affinity purification of proteins or organelles.

→ **Bead size:** For capture and handling of proteins, nucleic acids, or similar biomolecules, use the 1 µm Dynabeads® or the 2.8 µm Dynabeads®. The larger 4.5 µm Dynabeads® are well suited to isolate larger entities such as organelles or cells. Due to their size and high iron content, they exert a strong pull to the magnet, even in viscous samples, yet still retain gentle handling of the bound target.

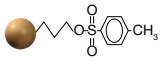
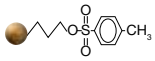
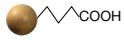
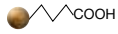
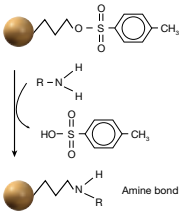
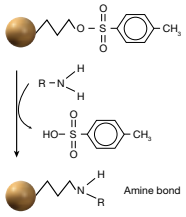
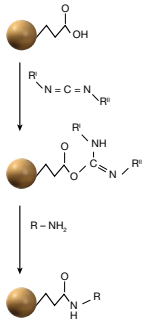
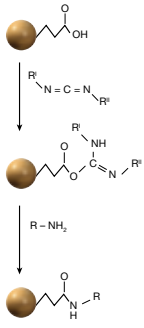
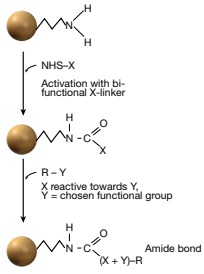
→ **Coupling considerations:** First consider the nature of the ligand (see Table 2 for details). How labile is the ligand? What active groups are available for coupling? The orientation of the active site of the ligand should also be taken into consideration. Hydrophobic beads facilitate interactions with hydrophobic parts of a protein, while hydrophilic beads are better suited when an interaction with hydrophilic parts of the protein is desired.

→ **Manual or automated protocols:** The 1 µm Dynabeads® are ideal for isolation of smaller entities such as proteins and phages. These beads are perfect for use in automated protocols where high throughput is crucial. They have a large surface area, high capacity, and efficient magnetic pull. Protocols have been developed for several commercially available robotic workstations.

Table 1. Product guide. The large portfolio of surface-activated Dynabeads® al

Surface-activated Dynabeads®	Dynabeads® M-270 Epoxy
	
Bead characteristics	• Hydrophilic bead • Surface epoxy groups
Bead size	• 2.8 µm diameter
Binding properties	• Typically binds 5–10 µg IgG per mg beads • Direct covalent binding to primary amino and sulfhydryl groups in proteins and peptides • No further surface activation required • Binding overnight at neutral pH, high salt, and a wide temperature range
Active chemical functionality	• 100–200 µmol/g beads
Main benefits	• The functionality of your enzyme is maintained after isolation • Extremely low nonspecific binding of proteins, dyes, etc., is observed with these pH-neutral beads, reduced need for blocking agents • Good orientation of coupled antibodies
Applications and reaction chemistries	• Immunoprecipitation of proteins and protein complexes • Purification of temperature-labile proteins and active proteins such as enzymes • Analysis of enzymatic reactions by coupling the enzyme directly onto the beads • Immobilization of protein A and G 

lows for application flexibility.

Dynabeads® M-280 Tosylactivated	Dynabeads® MyOne™ Tosylactivated	Dynabeads® M-270 Carboxylic Acid	Dynabeads® MyOne™ Carboxylic Acid	Dynabeads® M-270 Amine
				
• Hydrophobic bead • Surface tosyl groups	• Hydrophobic bead • Surface tosyl groups	• Hydrophilic bead • Surface carboxylic acid groups	• Hydrophilic bead • Surface carboxylic acid groups	• Hydrophilic bead • Surface amino groups
• 2.8 µm diameter	• 1 µm diameter	• 2.8 µm diameter	• 1 µm diameter	• 2.8 µm diameter
• Typically binds 10–15 µg IgG per mg beads • Direct covalent binding to primary amino and sulfhydryl groups in proteins and peptides • No further surface activation required • Binding overnight at neutral to high pH and 37°C	• Typically binds 15–20 µg IgG per mg beads • Direct covalent binding to primary amino and sulfhydryl groups in proteins and peptides • No further surface activation required • Binding overnight at neutral to high pH and 37°C	• Typically binds 5–10 µg IgG per mg beads • Covalent amide bond formation with primary amino groups in proteins and peptides • Activation through carbodiimide is required • Immediate peptide bond formation at pH 5–6 and room temperature	• Typically binds 10–15 µg IgG per mg beads • Covalent amide bond formation with primary amino groups in proteins and peptides • Activation through carbodiimide is required • Immediate peptide bond formation at pH 5–6 and room temperature	• Typically binds 5 µg IgG per mg beads • Direct covalent binding through reductive amination of aldehydes • No further surface activation required • Rapid binding (less than 1 hour) at neutral to high pH and room temperature
• 100–200 µmol/g beads	• 40–60 µmol/g beads	• 200–250 µmol/g beads	• 400–800 µmol/g beads	• 100–200 µmol/g beads
• High capacity for isolating proteins using an immobilized antibody • Optimal orientation of coupled antibodies, typically bound via the more hydrophobic Fab region	• High capacity for isolating proteins using an immobilized antibody • Optimal orientation of coupled antibodies, typically bound via the more hydrophobic Fab region	• 100% covalent binding • Rapid binding chemistry • Low nonspecific binding of nucleic acids	• 100% covalent binding • Rapid binding chemistry • Low nonspecific binding of nucleic acids	• Rapid immobilization of carbohydrates, glycoproteins, and glycolipids (e.g., lipopolysaccharides) • Easy introduction of further alternative surface chemistries
• Immunoprecipitation of proteins and protein complexes • Protein purification • Isolation of fragile cells (the smaller beads are pulled gently to the magnet, ensuring the isolation of intact and viable cells) • *In vitro* diagnostics	• Immunoprecipitation of proteins and protein complexes • Protein purification • Isolation of rare cells (rapid kinetics due to high number of beads) • *In vitro* diagnostics	• Immobilization of labile proteins and peptides • N-terminal coupling of peptides • *In vitro* diagnostics	• Immobilization of labile proteins and peptides • N-terminal coupling of peptides • *In vitro* diagnostics	• Isolation of cells, proteins, or other target molecules with affinity for specific carbohydrate moieties • These beads can be used to introduce other reactive groups by coupling different crosslinking reagents • C-terminal coupling of peptides
				

Flexible and robust technology

Magnetic separation is increasingly used as a flexible and efficient tool in bioseparations. Gentle magnetic separation provides the opportunity to work with concentrated protein solutions throughout the isolation procedure, preserving both large protein complexes and the native state of proteins. No columns or centrifugations are needed.

Dynabeads® bring reproducibility and robustness to your research.

Table 2. Select the optimal bead for your specific application.

Ligand	Target	Dynabeads® Epoxy	Dynabeads® Tosylactivated	Dynabeads® Carboxylic Acid	Dynabeads® Amine
Antibody	Low MW antigen[1] or peptide	••	•••	••	••
	Protein or antibody[2]	•••	•••	••	•
	Protein complex	•••	••	•	•
	Organelle	••[3]	••		
	Phage[1]	••	•••	••	••
	Virus	••	•••	••	••
	Bacteria		•••		
	Cells[4]	•••	•••		
Antibody fragment	Phage[1] or antibody	••	••	•••	•••
Protein	Phage[1] or carbohydrate	•••	••	••	••
	Nucleic acid	•	•	•••	•
Peptide	Phage[1] or antibody	••	••	•••	•••
Carbohydrate	Antibody	•		•	•••
Low MW antigen	Antibody	••	••	••	••
Nucleic acid, oligonucleotide, aptamer, PNA	Nucleic acid binding proteins[1]		•	••	•[5]
	DNA,[1] RNA,[1] or PCR amplicons[1]			•••	•[5]
Enzyme	Substrate or target for enzyme degradation	•••	••	•	•
Organic chemistry derivatization, including introduction of new functional groups		••	••	••	•••

••• Best product choice for listed ligand and target
•• Alternative choice for listed ligand and target
• Can be used for listed ligand and target
[1] Dynabeads® precoupled with streptavidin may be the best product choice.
[2] Dynabeads® Antibody Coupling Kit contains Dynabeads® M-270 Epoxy and buffers required for covalent coupling.
[3] Dynabeads® M-450 Epoxy
[4] Dynabeads® M-450 are recommended for isolation, activation, and expansion of cells.
[5] Dynabeads® Amine are modified with an appropriate bifunctional crosslinker prior to immobilization of oligonucleotides.

Ordering information

Products	Concentration	Quantity	Cat. No.
Dynabeads® M-270 Epoxy	Freeze-dried	60 mg	143-01
Hydrophilic 2.8 µm beads with epoxy groups		300 mg	143-02D
Dynabeads® M-280 Tosylactivated	30 mg/mL	2 mL	142-03
Hydrophobic 2.8 µm beads with tosyl groups	30 mg/mL	10 mL	142-04
Dynabeads® MyOne™ Tosylactivated	100 mg/mL	2 mL	655-01
Hydrophobic 1 µm beads with tosyl groups		10 mL	655-02
		100 mL	655-03
Dynabeads® M-270 Carboxylic Acid	2 x 10^9 beads/mL	2 mL	143-05D
Hydrophilic 2.8 µm beads with carboxylic acid groups		10 mL	143-06D
Dynabeads® MyOne™ Carboxylic Acid	10 mg/mL	2 mL	650-11
Hydrophilic 1 µm beads with carboxylic acid groups		10 mL	650-12
		100 mL	650-13
Dynabeads® M-270 Amine	30 mg/mL	2 mL	143-07D
Hydrophilic 2.8 µm beads with amino groups		10 mL	143-08D

Related products

Dynabeads® M-450 Epoxy	4 x 10^8 beads/mL	5 mL	140-11
Hydrophobic 4.5 µm beads with epoxy groups			
Dynabeads® M-450 Tosylactivated	4 x 10^8 beads/mL	5 mL	140-13
Hydrophobic 4.5 µm beads with tosyl groups			
Dynabeads® Antibody Coupling Kit	1 kit	60 mg	143-11D
Includes Dynabeads® M-270 Epoxy and multiple buffers for covalent coupling of antibodies		(freeze-dried)	
Dynabeads® His-Tag Isolation & Pulldown	40 mg/mL	2 mL	101-03D
Cobalt-based bead surface chemistry with high selectivity for polyhistidine-tagged proteins	40 mg/mL	10 mL	101-04D
DynaMag™ magnets	See www.invitrogen.com/magnets for magnet recommendations.		
HulaMixer™ Sample Mixer		1 unit	159-20D
Holds 0.5 mL–50 mL tubes			
For pricing and further information, please visit www.invitrogen.com.			

A comprehensive selection of Dynabeads® is available. Some Dynabeads® are precoupled with specific ligands (e.g., streptavidin, protein A or G, antibodies, etc.). Other Dynabeads® have a specific surface chemistry for ligand coupling. We are also able to work with our customers to develop and customize products on an OEM basis. If you would like to discuss a potential collaboration or OEM agreement, please contact us by email at oemdynal@lifetech.com.

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DYNAL® has pioneered magnetic separation technologies for biological discovery that are both simple and highly reproducible. Based on their patented superparamagnetic, monodisperse beads, Dynabeads® technologies represent a superior paradigm for cell and biomolecule separation in a wide range of basic and clinical research applications, diagnostic assays, and therapeutic protocols.

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